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HYPERTENSION AND ITS IDENTIFICATION AMONG CURRENT, PAST AND NEVER SMOKERS IN AN ENGLISH POPULATION SAMPLE

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Conflict of interest

Lion Shahab has received an honorarium for a talk and travel expenses form a pharmaceutical company making smoking cessation products. Robert West undertakes research and consultancy for developers and manufacturers of smoking cessation treatments such as nicotine replacement products.

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Background: Clinical guidelines recommend prioritising efforts to treat hypertension in people with other cardiovascular risk factors, including smoking, but few contemporary data are available on awareness of hypertension among smokers. This study aimed to determine the prevalence of hypertension awareness in hypertensive smokers and its association with receiving and acting on advice to stop smoking.

Design: Cross-sectional surveys in 2003 and 2006.

Methods: Data, including socio-demographic, life-style and smoking characteristics and provision of advice to stop smoking were collected from 20202 adults participating in the Health Survey for England. Self-report was used to determine awareness of hypertension; blood pressure readings were taken by a trained nurse to identify hypertension objectively.

Results: Current smokers with objectively defined hypertension were less aware of their hypertension than hypertensive past or never smokers: only half of hypertensive smokers reported having received a diagnosis with hypertension (51.3%, 95%CI 48.8-53.8). After adjustment for confounding, this difference in awareness between current and past smokers remained significant (OR 1.32, 95%CI 1.12-1.55) but became non-significant when comparing current and never smokers (OR 1.05, 95%CI 0.88-1.25). However, hypertension awareness increased between 2003 and 2006 irrespective of smoking status. After adjusting for confounders, smokers aware of their hypertension were more likely to have received advice to stop smoking (OR 3.29, 95%CI 2.59-4.18) and to have stopped smoking (OR 1.58, 95%CI 1.32-1.89) than smokers unaware of their hypertension.

Conclusions: The diagnosis of hypertension is picked up less frequently among smokers than non-smokers. This is particularly important because receiving a diagnosis appears to motivate cessation.

Word count: 247

Key words (MeSH): hypertension; prevention and control; risk factors; smoking;

smoking cessation

INTRODUCTION

Smoking and hypertension are among the most important preventable and treatable causes of premature deaths worldwide, killing in excess of five and seven million people, respectively each year.[1] Smoking is known to lead to an acute increase in heart rate and blood pressure. [2] However, the long-term impact of smoking on blood pressure and hypertension is less clear.[3] The inconsistency of findings may in part be due to biases arising from the assessment of blood pressure taken either ambulatory over 24 hours or opportunistically in a clinic.[4] Whatever the precise relationship between smoking and high blood pressure, it is well established that both contribute to cardiovascular disease (CVD) and act in a multiplicative fashion to increase CVD risk,[3] possibly mediated by the differential impact of smoking in hypertensives on arterial stiffness.[5]

Clinical guidelines for hypertension stress the importance of physicians providing advice on lifestyle modification, such as smoking cessation, to reduce the overall risk of serious cardiovascular events.[6 7] Guidelines also advise that efforts to detect and treat hypertension should be increased among people with other concomitant CVD risk factors including smoking. However, while evidence suggests that making a diagnosis of heart disease or related risk factors may increase the likelihood of smoking cessation,[8] relatively little is currently known about the provision of advice to stop smoking to hypertensive smokers and the impact of awareness of a diagnosis of hypertension on smoking behaviour. Moreover, considering that the detection of hypertension is particularly pertinent for smokers, it is noteworthy that an earlier study from the UK [9] reported a reduced level of awareness of having hypertension in smokers compared with non-smokers. However, data from that study were collected in 1994 prior to recent changes in the guidelines for the treatment of people with hypertension,[6 7] target

5

payments to general practitioners for recording patients' cardiovascular risk-factors [10] and the introduction of the National Service Framework for coronary heart disease.[11] Improvements in awareness, treatment, and control of hypertension in the general population have been demonstrated between 2003 and 2006.[12]

In order to address these issues in relation to smoking, the present study used data from the most recent Health Surveys for England that focused on cardiovascular diseases to assess the detection of hypertension in smokers and its association with smoking cessation. In particular, this study sought to determine:

1.) The level of awareness of hypertension among smokers compared with past and never smokers.

2.) The association of being aware of a diagnosis of hypertension and the provision of stop smoking advice.

3.) The association of being aware of a diagnosis of hypertension and smoking cessation.

METHODS

Procedure and participants

Data came from the Health Survey for England (HSE), an annual cross-sectional household survey that assesses the health of the population of England using a two stage process: an individual home interview followed by a nurse visit involving a number of objective health measurements. In both 2003 and 2006, the HSE focused on risk factors for cardiovascular disease. The methodology has been described in detail elsewhere.[13] Briefly, private households were identified with a multi-stage probability stratified sampling design and their members invited to participate. Of eligible households, 73% (n=8867 households) took part in 2003 and 68% (n=8614 households) in 2006. Interview responses were available for 90% (n=28978) of eligible adults (16+ years of age) in the participating household samples and valid blood pressure readings for 66% (n=21349) of these adults. Participants were included in analyses if they had complete data (valid blood pressure readings, data on medication use and self-reported diagnosis with hypertension), resulting in an effective sample size of 20202 (unweighted) or 18645 (weighted) participants. For the purpose of the analysis, data from the 2003 and 2006 surveys were pooled unless when comparing changes across years. Approval was obtained from the relevant Research Ethics Committees prior to each survey.

Measures

Socio-demographic and anthropometric characteristics

During the interview data on a range of demographic characteristics were collected including age, sex, ethnicity and occupational status. The level of deprivation was assessed using the Index of Multiple Deprivation (IMD), a reliable measure of relative poverty based on post codes.[14] Following a standard protocol,[13] height and weight were measured by the interviewer to determine the body mass index (BMI; kg/m^2).

Blood pressure

Blood pressure readings were collected during the nurse visit using the Omron HEM-907.[15] Three measurements in the sitting position were taken at one minute intervals on the right arm after 5 minutes rest; the mean of the last two readings were used in analysis. Participants' blood pressure readings were excluded if they had eaten, drunk alcohol or taken vigorous exercise within 30 minutes prior to measurement (N=1034 in 2003 and N=776 in 2006) or if they were pregnant. In order to increase power for analysis, participants who had smoked within 30 minutes were included in the sample (N=798 in 2003 and N=560 in 2006) as there was no difference in blood pressure compared with those who had smoked more than 30 minutes ago when controlling for cigarette consumption. Diastolic blood pressure for those who had smoked within 30 minutes and those who had not was 74.2 and 73.3 mm Hg (p=0.129) in 2003 and 74.0 and 73.6 mm Hg (p=0.513) in 2006, respectively. Corresponding systolic blood pressure for those who had smoked within 30 minutes and those who had not was 127.2 and 125.9 mm Hg (p=0.097) in 2003 and 126.1 and 125.8 mm Hg (p=0.779) in 2006, respectively. Moreover, sensitivity analyses showed no significant changes in estimated values when these participants were excluded.

Hypertension

Self report

During the interview, participants were asked if they currently had or had ever had high blood pressure, and if so, whether a doctor had told them they had hypertension (apart from during pregnancy). During the nurse visit, participants were asked about their current use of medication and, for cardiovascular drugs, whether they were used to control blood pressure. Participants were considered to be aware of their hypertension if

they said 'Yes' to the former two questions and/or if they reported taking medication to control high blood pressure.

Objective assessment

In line with guidelines,[6] objective hypertension was defined as receiving treatment for hypertension or as having a systolic blood pressure of ≥ 140 mm Hg and/or a diastolic blood pressure of ≥ 90 mm Hg.

Lifestyle risk factors

Alcohol consumption in the last week was assessed by self report and excessive alcohol consumption ('binge drinking') defined as drinking twice the recommended daily amount of alcohol (8 units for men and 6 units for women) on at least one occasion in the past week, following the Office for National Statistics definition at the time.[16] Physical activity was determined with a short questionnaire adapted from the Allied Dunbar National Fitness Survey.[17] Current guidelines recommend 30 min or more of moderate activity at least five times per week,[18] and participants were defined as insufficiently active if they did not reach this recommended level of exercise. Fruit and vegetable consumption was determined by questionnaire items that assessed intake over the preceding 24h using everyday measures of consumption that were converted to standardized portion measures (80 g serving). In line with current recommendations,[19] insufficient consumption was defined as having less than five portions of fruit or vegetables per day. Obesity was defined as having a BMI of 30 kg/m^2 or above.

Smoking characteristics

Smoking status was assessed by self-report. Participants were asked to indicate whether they had ever smoked, and if so, whether they smoked currently and what type of tobacco (cigarettes, pipe, cigar). Smoking status was computed stratifying participants

into current cigarette smokers and current and past and never smokers of all types of tobacco using the most recent available response from either the interview or nurse visit. For current cigarette smokers, nicotine dependence was estimated with the Heaviness of Smoking Index (HSI).[20] The HSI is calculated from the time to the first cigarette (4 categories, 0-3) and cigarettes per day (4 categories, 0-3), producing a scale from 0 to 6 with higher scores indicating greater nicotine dependence. Smokers were also asked whether they had ever been advised to stop smoking by a health professional.

Analysis

Data were analysed using SPSS 16.0. Complex samples procedures were used to take into account the clustered, stratified, multi-stage sample design. Weights were available for the interview and nurse visit for both years to allow for non-response differences. Since only participants with valid blood pressure readings at the nurse visit were included, nurse weights were applied to the sample in descriptive and unadjusted analysis. When adjusting for confounders in complex samples procedures, weights were not applied. Differences between hypertensives and non-hypertensives or smokers and non-smokers were tested with complex samples crosstabs, logistic regression and generalised linear models (GLM) and, where appropriate, included putative confounders (socio-demographic and smoking characteristics, blood pressure and CVD lifestyle risk factors) as covariates. Adjusted values for continuous and dichotomous variables were derived from GLM using estimated marginal means. As complex analysis of the weighted sample showed that included participants in 2006 were younger (p<0.001) and more likely to be non-white (p=0.036) than those in 2003, all comparisons between years were adjusted for these covariates.

RESULTS

More than a quarter of the total sample (25.5%; 95%CI 24.7 - 26.2) reported being aware of having hypertension whereas 29.0% (95% CI 28.2 - 29.8) of participants had objectively determined high blood pressure and/or were currently on medication for hypertension. Objective hypertension was more common among older and male participants. After adjusting for age and sex, those with objective hypertension were also more likely to be non-white, in manual occupations and deprived (Table 1).

Table 1 about here

Current cigarette smoking was significantly less common among those with objective hypertension than among those without it (18.3% and 26.4%, respectively; p<0.001). However, after adjusting for socio-demographic confounders (age, sex, occupation and ethnicity), this difference was attenuated and the prevalence of either cigarette smoking or smoking of any kind was very similar for those with and without objective hypertension (Table 1). While those with hypertension were significantly more likely to have smoked in the past (44.4% and 33.9%, respectively; p<0.001) and were less likely to be never smokers (35.7% and 38.9%, respectively; p<0.001), these differences did not persist when controlling for socio-demographic variables (Table 1). Cigarette consumption (p=0.013) and nicotine dependence (p=0.026) were significantly higher in smokers with than without hypertension but did not vary as a function of objective hypertension in adjusted analyses (Table 1).

In terms of other life-style factors, people with objectively defined hypertension tended to display unhealthier behaviours than those without hypertension. When socio-demographic differences were taken into account, hypertensives were significantly more

likely than non-hypertensives to be inactive (OR 1.40, 95%CI 1.28-1.52), not to consume enough fruit and vegetables (OR 1.10, 95%CI 1.02-1.19), to have high alcohol consumption (OR 1.22, 95%CI 1.10-1.36) and to be obese (OR 2.47, 95%CI 2.27-2.69; Table 1).

Level of awareness of hypertension among hypertensive current, past and never smokers

Overall, nearly two thirds of people with objective hypertension in the total sample were aware of this diagnosis (61.7%, 95%CI 60.4-63.1). People with objective hypertension who reported a diagnosis with hypertension tended to be older (p<0.001), were more likely to be female (OR 1.38, 95%CI 1.23-1.54) and, after adjusting for age and sex, more likely to be non-white (OR 1.82, 95%CI 1.40-2.35) and to be deprived (OR 1.25, 95%CI 1.08-1.45).

When looking at hypertension awareness by smoking status in adjusted analysis, past smokers were the most aware (67.3%, 95%CI 65.5-69.1) and were significantly more likely to report having been diagnosed than never smokers (OR 1.34, 95%CI 1.18-1.51) who had an intermediate level of awareness (60.6%, 95%CI 58.5-62.7) and in turn were more likely to report being aware of their hypertension than current smokers (OR 1.46, 95%CI 1.03-1.70) who had the lowest levels of awareness (51.3%, 95%CI 48.8-53.8).

Figure 1 about here

As shown in Figure 1, irrespective of smoking status reported awareness of hypertension increased significantly between 2003 and 2006. After controlling for age and ethnicity, past, never and, less so, current smokers were more likely to be aware of their objective

hypertension in 2006 than in 2003 (OR 1.36, 95%CI 1.16-1.60, OR 1.28, 95%CI 1.07-1.54 and OR 1.22, 95%CI 1.00-1.50, respectively).

In order to investigate the differences in rates of awareness of objective hypertension between current, past and never smokers, we controlled for potential confounders in analysis. Adjusting for socio-demographic variables and objectively measured systolic and diastolic blood pressure did not remove significant differences in awareness levels between hypertensive current, past and never smokers. We next included life-style risk factors in the regression model. Differences in awareness between hypertensive never and current smokers became non-significant when controlling for BMI, fruit and vegetable or alcohol consumption and activity levels (OR 1.05, 95%CI 0.88-1.25). Body mass index was the only lifestyle risk factor contributing significantly to this model (p<0.001); hypertensive current smokers had a much lower BMI than hypertensive never smokers controlling for socio-demographic differences (p<0.001). In contrast, hypertensive past smokers remained significantly more likely to report a diagnosis of hypertension in this adjusted model compared with both hypertensive current (OR 1.32, 95%CI 1.12-1.55) and never smokers (OR 1.26, 95%CI 1.09-1.45).

Association of being aware of the diagnosis of hypertension and the provision of advice to stop smoking

Smokers who were aware of their hypertension were twice as likely to report having received advice to stop smoking (59.9%; 95%CI 56.2-63.4) than smokers who were unaware of their hypertension (30.0%; 95%CI 26.4-33.7). This remained the case when adjusting for nicotine dependence, socio-demographic and life-style characteristics (OR 3.29, 95%CI 2.59-4.18; Figure 2). Separate analysis for 2003 and 2006 confirmed this result.

Overall, however, the rate of advice to stop smoking provided to all smokers with objective hypertension increased significantly by 8% between 2003 and 2006 after adjusting for age and ethnicity (p=0.002) and the same effect was apparent whether smokers were aware of their hypertension or not (Figure 2).

Figure 2 about here

Association of being aware of the diagnosis of hypertension and smoking cessation

In the total sample, the proportion of hypertensives who had stopped smoking was higher among those who were aware of their diagnosis (74.6%; 95%CI 72.7-76.4) than among those who were not (60.1%; 95%CI 57.5-62.7). Adjusting for socio-demographic differences, life-style risk factors, current or past cigarette consumption and blood pressure confirmed that those aware of their diagnosis were more likely to have stopped smoking (OR 1.58, 95%CI 1.32-1.89). As shown in Figure 3, this was the case for both 2003 and 2006, and there were no changes in the rate of stopping smoking between years among those aware of their hypertension or not.

Figure 3 about here

DISCUSSION

Smokers with blood pressure levels currently classified as hypertensive [6] were less likely than past smokers or never smokers to be aware of their hypertensive status. However, there was a significant improvement from 2003 to 2006 in awareness rates irrespective of smoking status. In adjusted analysis, differences between hypertensive never and current smokers were accounted for statistically by lifestyle factors, in particular by smokers having a lower BMI, but hypertensive ex-smokers remained significantly more likely to be aware of their hypertension than either never or current smokers.

There are a number of explanations for the observed association of hypertension awareness and current smoking. Whilst the rate of provision of advice to stop smoking increased from 2003 to 2006 in all hypertensive smokers, we found that, as previously reported for asthma,[21] more smokers aware than unaware of their condition (in this case hypertension) reported receiving advice to stop smoking. In addition, awareness of hypertension was associated with a greater likelihood of having stopped smoking in both 2003 and 2006. Similar results have been reported in relation to awareness of various circulatory disorders and smoking cessation.[22] The finding that past smokers were more likely to be aware of their hypertension than current smokers may therefore reflect that fact that smokers diagnosed as hypertensive would be more likely to receive and respond to advice to stop smoking as observed in this study.

The finding that current smokers were less likely to be aware of their hypertension than never smokers may be due to several reasons. Our findings point to lower body weight as a possible explanatory factor. It may be that overweight is an important trigger for GPs to record blood pressure given the near linear association between blood pressure

and BMI [23] and that because smokers are leaner,[24] they are less likely to have their BP measured. It is also plausible that leaner adults are less likely to visit the GP and therefore are less likely to be monitored. These important issues need more focused attention in future studies.

One limitation of the present study is that data used in the analysis, such as doctor diagnosis of hypertension, smoking status and advice to stop smoking, were self-reported. However, evidence suggests that self-reported CVD is a reasonably valid measure of an actual diagnosis,[25] that the impact of misreporting on smoking prevalence is relatively small [26] and that, if anything, self-reported data overestimate the rates of provision of advice to stop smoking.[27] Prevalence of hypertension may have been overestimated as blood pressure was measured on a single occasion only. However, precautions were taken to reduce the risk of artificially high blood readings (e.g. a nurse, not a physician measured blood pressure). In this light, it is also interesting to note that there were no differences in blood pressure between smokers who had smoked within the last half hour and those who had not. This may reflect the fact that the timeframe chosen (30 minutes) is too wide to pick up acute changes in blood pressure due to smoking. Lastly, the data presented are cross-sectional. However, it is not possible to conduct similar analyses using a cohort study because of the ethical imperative to inform participants – and, with their permission, their GPs – of raised blood pressure readings, thus interfering with the likelihood of diagnosis and management.

In 2004, the Quality and Outcomes Framework (QOF) was implemented in an effort to improve the detection, management and treatment of chronic diseases in primary care in the UK.[28] QOF provides monetary incentives for GPs to routinely assess blood pressure among patients above the age of 45, to record the smoking status of registered

patients with hypertension, and to advise them to stop. In agreement with data from the general population, [12] our findings suggest that in hypertensive smokers the identification of hypertension as well as the rate of advice to stop smoking increased following the introduction of QOF. However, considering the observed clustering of unhealthy life-style choices among hypertensive adults and the synergistic effects on CVD risk arising from the combination of smoking with hypertension and other risk factors, an even greater effort is required to reduce smoking prevalence among individuals displaying any such risk factors. Intensive interventions can be very effective in this population,[29] and the increase in advice to stop smoking provided to hypertensive smokers is encouraging. Yet, smokers at greater cardiovascular risk must also be identified to maximise the impact of cessation advice. Whilst the detection of hypertension among smokers compares favourably with the detection of other diseases in smokers such as COPD,[30] smokers were still less likely to be aware of their hypertension than non-smokers. A diagnosis of heart disease or a risk factor such as hypertension has the potential to become a "teachable moment",[31] which may provide an additional impetus for cessation and the greater rate of smoking cessation among aware compared with unaware hypertensive patients supports this hypothesis. These findings highlight that it is all the more important that hypertensive smokers should be made aware of their hypertensive status.

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Table 1: Sample characteristics by objective hypertension[∂]

	Total Sample	No hypertension	Hypertension	P
Demographics				
Mean (SD) age	45.8 (27.3)	40.2 (21.4)	59.4 (18.6)	<0.001
% (n/N) Male	48.9 ($^{9126}/_{18645}$)	47.7 ($^{6321}/_{13238}$)	51.9 ($^{2805}/_{5407}$)	<0.001
% (n/N) White	90.9 ($^{16935}/_{18635}$)	93.4 ($^{12471}/_{13290}$)[†]	91.7 ($^{6317}/_{6893}$)[†]	<0.001
% (n/N) Manual occupation	41.4 ($^{7268}/_{17561}$)	38.9 ($^{4912}/_{12631}$)[†]	43.7 ($^{2925}/_{6687}$)[†]	<0.001
% (n/N) Lowest quintile IMD	17.2 ($^{3203}/_{18645}$)	15.4 ($^{2052}/_{13301}$)[†]	18.6 ($^{1284}/_{6901}$)[†]	<0.001
Smoking characteristics				
% (n/N) Cigarette smoking prevalence				
Age 16-24	28.0 ($^{716}/_{2557}$)	27.8 ($^{679}/_{2443}$)	32.7 ($^{37}/_{114}$)	0.306
Age 25-34	32.3 ($^{995}/_{3085}$)	32.2 ($^{904}/_{2808}$)	33.0 ($^{91}/_{277}$)	0.822
Age 35-44	27.5 ($^{1034}/_{3756}$)	27.3 ($^{872}/_{3197}$)	29.1 ($^{162}/_{559}$)	0.411
Age 45-54	24.9 ($^{797}/_{3198}$)	26.1 ($^{584}/_{2240}$)	22.3 ($^{213}/_{958}$)	0.022
Age 55-64	20.3 ($^{600}/_{2960}$)	21.2 ($^{327}/_{1545}$)	19.3 ($^{273}/_{1415}$)	0.173
Age 65-74	13.0 ($^{216}/_{1660}$)	13.7 ($^{80}/_{582}$)	12.6 ($^{136}/_{1078}$)	0.441
Age 75+	8.3 ($^{116}/_{1400}$)	10.4 ($^{41}/_{393}$)	7.5 ($^{75}/_{1007}$)	0.033
All ages				
Current cigarette smoker	24.0 ($^{4475}/_{18616}$)	23.3 ($^{2936}/_{12608}$)[‡]	22.0 ($^{1470}/_{6681}$)[‡]	0.045
Current smoker	25.0 ($^{4662}/_{18616}$)	24.3 ($^{3062}/_{12608}$)[‡]	23.4 ($^{1561}/_{6681}$)[‡]	0.149
Past smoker	37.0 ($^{6880}/_{18616}$)	40.2 ($^{5072}/_{12608}$)[‡]	40.0 ($^{2670}/_{6681}$)[‡]	0.712
Never smoker	38.0 ($^{7076}/_{18616}$)	35.5 ($^{4473}/_{12608}$)[‡]	36.7 ($^{2451}/_{6681}$)[‡]	0.122
Mean (SD) cigarettes/day[$]	14.6 (9.3)	14.7 (8.5)[‡]	15.0 (9.6)[‡]	0.326
Mean (SD) dependence rating[$]	3.6 (1.2)	3.6 (1.0)[‡]	3.6 (1.1)[‡]	0.417
CVD lifestyle risk factors				
% (n/N) Inactive lifestyle[¶]	66.6 ($^{11734}/_{17625}$)	66.7 ($^{8121}/_{12175}$)[‡]	72.9 ($^{4173}/_{5727}$)[‡]	<0.001
% (n/N) Low fruit/veg consumption[#]	73.6 ($^{13721}/_{18645}$)	71.9 ($^{9073}/_{12620}$)[‡]	73.8 ($^{4927}/_{6681}$)[‡]	0.014
% (n/N) Obese[~]	23.5 ($^{4058}/_{17271}$)	19.7 ($^{2305}/_{11732}$)[‡]	37.6 ($^{2168}/_{5763}$)[‡]	<0.001
% (n/N) High alcohol consumption^	17.2 ($^{3190}/_{18538}$)	14.2 ($^{1790}/_{12568}$)[‡]	16.9 ($^{1129}/_{6670}$)[‡]	<0.001

[∂]Date are weighted by nurse weight (N=18645) unless where indicated, when data are unweighted and adjusted for confounders – in all cases complex samples procedures were used; [†]Adjusted for age and sex; [‡]Adjusted for age, sex, ethnicity and occupation; [$]Cigarette smokers only (105 missing); [¶]Less than 5 times of 30 min moderate exercise per week; [#]Less then 5 portions of fruit and vegetable per week; [~]Body Mass Index ≥ 30 kg/m^2 ; ^More than twice daily recommended maximum number of alcohol units one at least one occasion last week

21

Figure legend

Figure 1: Awareness level among people with objective hypertension by year and smoking status; [#]Estimated marginal means derived from general linear model in complex analysis adjusted for age and ethnicity; Error bars: 95% confidence intervals of the proportion

Figure 2: Advice to stop smoking among current smokers with objective hypertension by year and awareness; [#]Estimated marginal means derived from general linear model in complex analysis adjusted for age and ethnicity; Error bars: 95% confidence intervals of the proportion

Figure 3: Quit ratio among people with objective hypertension by year and awareness; Quit ratio: past smokers as proportion of ever smokers; [#]Estimated marginal means derived from general linear model in complex analysis adjusted for age and ethnicity; Error bars: 95% confidence intervals of the proportion
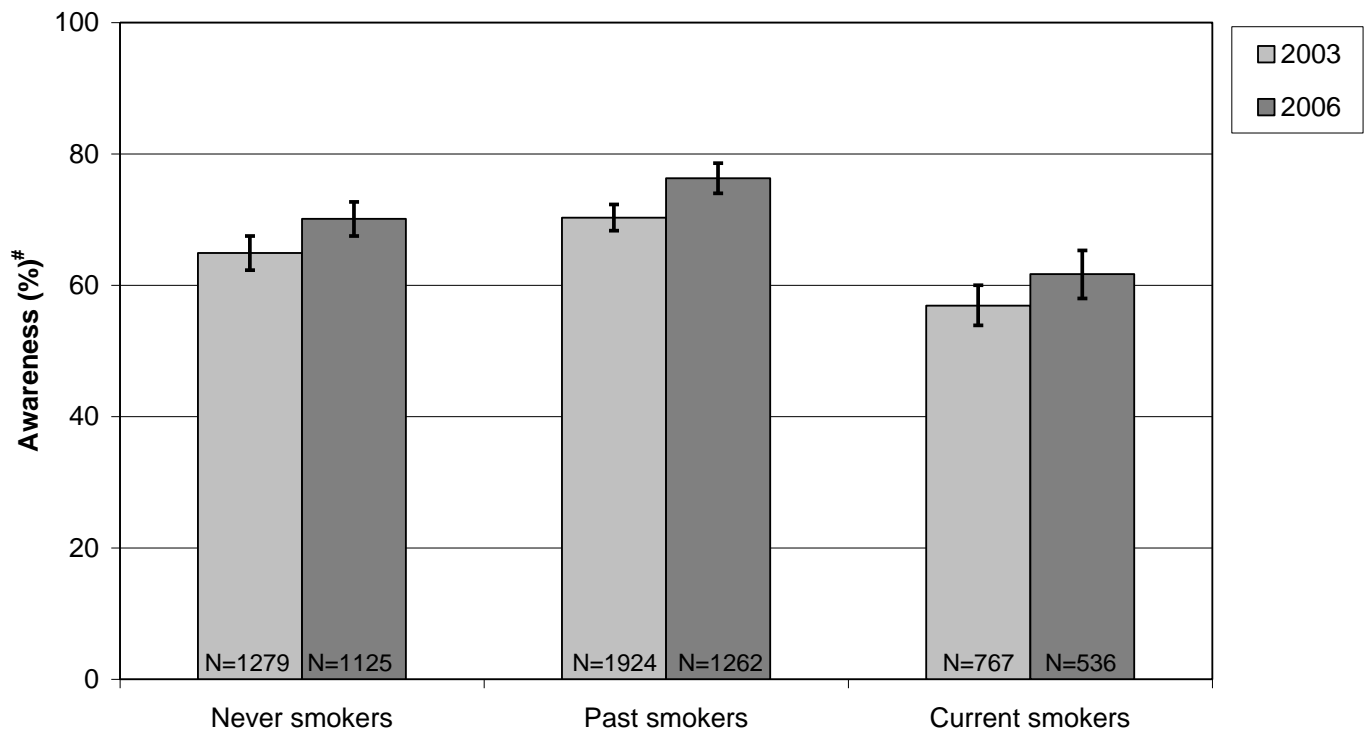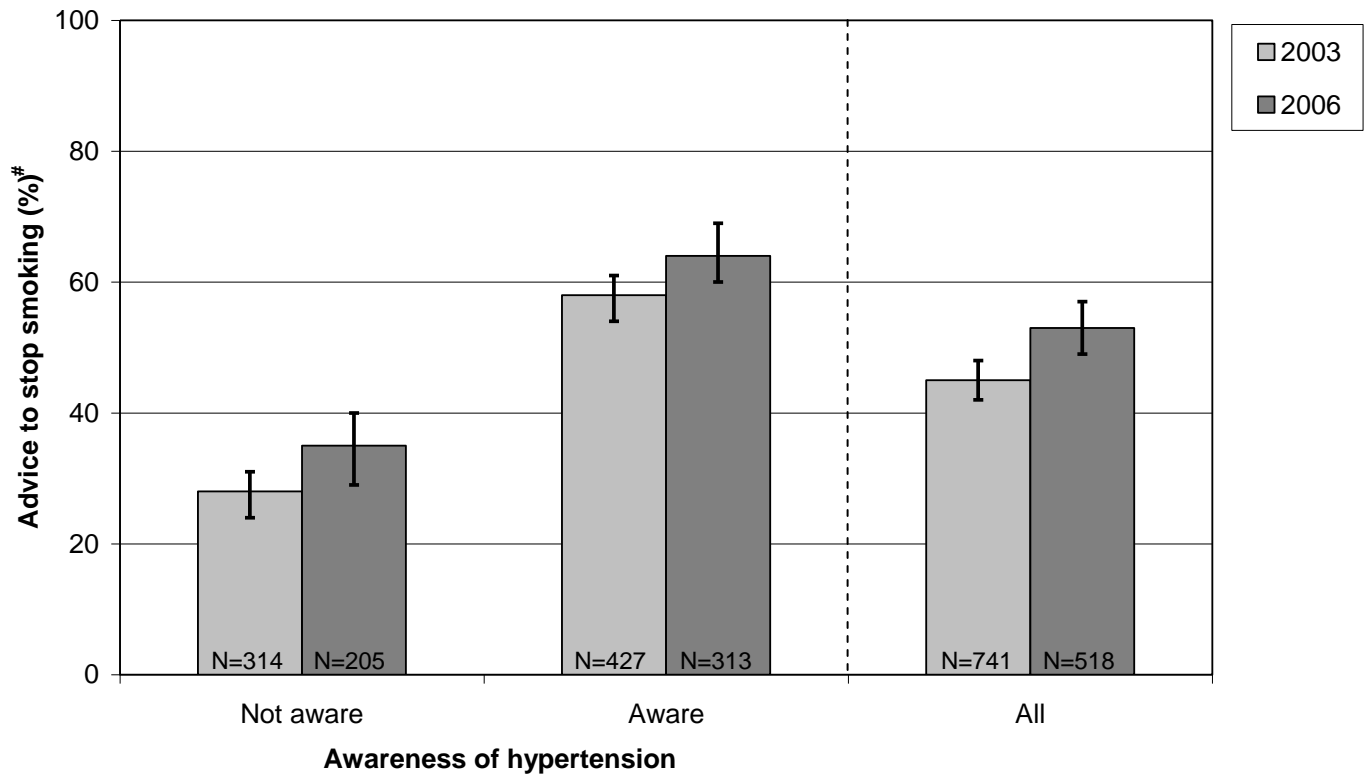
Figure 1

Figure 2

Figure 3